



SEQUENCE LISTING

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E. I. du Pont de Nemours and Company

<120> Plant Cellulose Synthases

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<213> Hordeum vulgare

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<213> Hordeum vulgare

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Ile Asn Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp Ala Leu Gly
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 Val Tyr Pro Ile Thr Ser Leu Pro Leu Ile Ala Tyr Cys Val Leu Pro
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 Tyr Ala Gly Met Phe Phe Ile Leu Met Phe Ala Ser Ile Phe Ala Thr
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 Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Thr Ser Ala His Leu Phe
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 Ala Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn
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 Phe Thr Val Thr Ser Lys Ala Asn Asp Glu Asp Gly Asp Phe Ala Glu
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 Asn Ser Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe
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 Ser Ile Trp Val Ile Leu His Leu Tyr Pro Phe Leu Lys Gly Leu Met
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 Gly Lys Gln Asn Arg Thr Pro Thr Ile Val Ile Val Trp Ser Ile Leu
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 <213> Zea mays

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Pro	Gly	Ile	Trp	Arg	Ser	Gly	Ser	Ala	Arg	Gly	Met	Glu	Ala	Ser	Ala	50	55	60	
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Pro	Phe	Val	Ala	Cys	Asn	Glu	Cys	Ala	Phe	Pro	Ile	Cys	Arg	Asp	Cys	115	120	125	
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Gly	Lys	Arg	Ile	His	Pro	Leu	Pro	Tyr	Ala	Asp	Pro	Asn	Leu	Pro	Val	245	250	255	
Gln	Pro	Arg	Ser	Met	Asp	Pro	Ser	Lys	Asp	Leu	Ala	Ala	Tyr	Gly	Tyr	260	265	270	
Gly	Ser	Val	Ala	Trp	Lys	Glu	Arg	Met	Glu	Ser	Trp	Lys	Gln	Lys	Gln	275	280	285	

Glu Arg Met His Gln Thr Arg Asn Asp Gly Gly Gly Asp Asp Gly Asp
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 Asp Ala Asp Leu Pro Leu Met Asp Glu Ala Arg Gln Pro Leu Ser Arg
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 Lys Ile Pro Leu Pro Ser Ser Gln Ile Asn Pro Tyr Arg Met Ile Ile
 325 330 335
 Ile Ile Arg Leu Val Val Leu Cys Phe Phe Phe His Tyr Arg Val Met
 340 345 350
 His Pro Val Pro Asp Ala Phe Ala Leu Trp Leu Ile Ser Val Ile Cys
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 Asp Lys Glu Gly His Pro Ser Gln Leu Ala Pro Val Asp Phe Phe Val
 405 410 415
 Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Val Thr Ala Asn Thr
 420 425 430
 Val Leu Ser Ile Leu Ser Val Asp Tyr Pro Val Asp Lys Val Ser Cys
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 Glu Thr Ser Glu Phe Ala Lys Lys Trp Val Pro Phe Cys Lys Arg Tyr
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 Tyr Leu Lys Asp Lys Val Ala Pro Asn Phe Val Arg Glu Arg Arg Ala
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 Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val
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 Ala Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr Met Gln Asp Gly
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 Thr Pro Trp Pro Gly Asn Asn Val Arg Asp His Pro Gly Met Ile Gln
 545 550 555 560
 Val Phe Leu Gly Gln Ser Gly Gly His Asp Val Glu Gly Asn Glu Leu
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 Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Tyr Asn His
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 His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ser Ala Val
 595 600 605

Leu Thr Asn Ala Pro Tyr Leu Leu Asn Leu Asp Cys Asp His Tyr Ile
 610 615 620

Asn Asn Ser Lys Ala Ile Lys Glu Ala Met Cys Phe Met Met Asp Pro
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Leu Leu Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln Arg Phe Asp
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Gly Ile Asp Arg His Asp Arg Tyr Ala Asn Arg Asn Val Val Phe Phe
 660 665 670

Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro Ile Tyr Val
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Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr Gly Tyr Asp Ala
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Pro Lys Thr Lys Lys Pro Pro Ser Arg Thr Cys Asn Cys Trp Pro Lys
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Trp Cys Ile Cys Cys Cys Cys Phe Gly Asn Arg Lys Thr Lys Lys Lys
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Thr Lys Thr Ser Lys Pro Lys Phe Glu Lys Ile Lys Lys Leu Phe Lys
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Lys Lys Glu Asn Gln Ala Pro Ala Tyr Ala Leu Gly Glu Ile Asp Glu
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Ala Ala Pro Gly Ala Glu Asn Glu Lys Ala Ser Ile Val Asn Gln Gln
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Lys Leu Glu Lys Lys Phe Gly Gln Ser Ser Val Phe Val Ala Ser Thr
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Leu Leu Glu Asn Gly Gly Thr Leu Lys Ser Ala Ser Pro Ala Ser Leu
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Leu Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys Thr
 820 825 830

Gly Trp Gly Lys Asp Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp
 835 840 845

Ile Leu Thr Gly Phe Lys Met His Cys His Gly Trp Arg Ser Ile Tyr
 850 855 860

Cys Ile Pro Lys Arg Ala Ala Phe Lys Gly Ser Ala Pro Leu Asn Leu
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Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser Ile Glu
 885 890 895

Ile Phe Phe Ser Asn His Cys Pro Leu Trp Tyr Gly Tyr Gly Gly Gly
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Leu Lys Phe Leu Glu Arg Phe Ser Tyr Ile Asn Ser Ile Val Tyr Pro
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Trp Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Leu Pro Ala Ile Cys
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His Glu Thr Glu Trp Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val
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Thr Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys Arg Gly Trp Lys
 20          25          30

Ser Val Tyr Cys Thr Pro Thr Arg Pro Ala Phe Lys Gly Ser Ala Pro
 35          40          45

Ile Asn Leu Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly
 50          55          60

Ser Val Glu Ile Phe Met Ser Arg His Cys Pro Leu Trp Tyr Ala Tyr
 65          70          75          80

Gly Gly Arg Leu Lys Trp Leu Glu Arg Phe Ala Tyr Thr Asn Thr Ile
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Val Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Ile Pro
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Ala Val Cys Leu Leu Thr Gly Lys Phe Ile Ile Pro Thr Leu Asn Asn
115          120          125

Leu Ala Ser Ile Trp Phe Ile Ala Leu Phe Leu Ser Ile Ile Ala Thr
130          135          140

Ser Val Leu Glu Leu Arg Trp Ser Gly Val Ser Ile Glu Asp Trp Trp
145          150          155          160

Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe
165          170          175

Ala Val Phe Gln Gly Phe Leu Lys Val Leu Gly Gly Val Asp Thr Ser
180          185          190

Phe Thr Val Thr Ser Lys Ala Ala Gly Asp Glu Ala Asp Ala Phe Gly
195          200          205

Asp Leu Tyr Leu Phe Lys Trp Thr Thr Leu Leu Val Pro Pro Thr Thr
210          215          220

Leu Ile Ile Ile Asn Met Val Gly Ile Val Ala Gly Val Ser Asp Ala
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Val Asn Asn Gly Tyr Gly Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe
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Met Gly Arg Gln Asn Arg Thr Pro Thr Ile Val Val Leu Trp Ser Ile
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Leu Leu Ala Ser Ile Phe Ser Leu Val Trp Val Arg Ile Asp Pro Phe
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Gln Met Ser Tyr Gly Arg Gly Gly Asp Ala His Pro Gly Phe Ser Pro
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Val Pro Asn Val Pro Leu Leu Thr Asn Gly Gln Met Val Asp Asp Ile
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Pro Pro Glu Gln His Ala Leu Val Pro Ser Tyr Met Ser Gly Gly Gly
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Ala Asn Thr Val Leu Ser Ile Leu Ser Val Asp Tyr Pro Val Glu Lys
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Lys	Ile	Asp	Tyr	Leu	Lys	Asp	Lys	Val	Ala	Ala	Ser	Phe	Val	Arg	Glu	515	520	525	
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Cys Pro Gln Cys Lys Thr Arg Tyr Lys Arg Leu Lys Gly Cys Gln Arg
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Tyr Gly His Met Ser Tyr Gly Arg Gly Gly Asp Pro Asn Gly Ala Pro
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 Cys Lys Arg Tyr Asn Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gln
 420 425 430
 Gln Lys Ile Asp Tyr Leu Lys Asp Lys Val Ala Ala Asn Phe Val Arg
 435 440 445
 Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile
 450 455 460
 Asn Ala Leu Val Ala Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr
 465 470 475 480

Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn Val Arg Asp His Pro
 485 490 495
 Gly Met Ile Gln Val Phe Leu Gly Gln Ser Gly Gly Leu Asp Cys Glu
 500 505 510
 Gly Asn Glu Leu Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro
 515 520 525
 Gly Tyr Asn His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg
 530 535 540
 Val Ser Ala Val Leu Thr Asn Ala Pro Tyr Leu Leu Asn Leu Asp Cys
 545 550 555 560
 Asp His Tyr Ile Asn Asn Ser Lys Ala Ile Lys Glu Ala Met Cys Phe
 565 570 575
 Met Met Asp Pro Leu Leu Gly Lys Lys Val Cys Tyr Val Gln Phe Pro
 580 585 590
 Gln Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr Ala Asn Arg Asn
 595 600 605
 Val Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly
 610 615 620
 Pro Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr
 625 630 635 640
 Gly Tyr Asp Ala Pro Lys Thr Lys Lys Pro Pro Ser Arg Thr Cys Asn
 645 650 655
 Cys Trp Pro Lys Trp Cys Phe Cys Cys Cys Cys Phe Gly Asn Arg Lys
 660 665 670
 Gln Lys Lys Thr Thr Lys Pro Lys Thr Glu Lys Lys Lys Leu Leu Phe
 675 680 685
 Phe Lys Lys Glu Glu Asn Gln Ser Pro Ala Tyr Ala Leu Gly Glu Ile
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 Asp Glu Ala Ala Pro Gly Ala Glu Asn Glu Lys Ala Gly Ile Val Asn
 705 710 715 720
 Gln Gln Lys Leu Glu Lys Lys Phe Gly Gln Ser Ser Val Phe Val Thr
 725 730 735
 Ser Thr Leu Leu Glu Asn Gly Gly Thr Leu Lys Ser Ala Ser Pro Ala
 740 745 750
 Ser Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Asp
 755 760 765
 Lys Thr Asp Trp Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr
 770 775 780
 Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys His Gly Trp Arg Ser
 785 790 795 800

Ile Tyr Cys Ile Pro Lys Arg Val Ala Phe Lys Gly Ser Ala Pro Leu
 805 810 815
 Asn Leu Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser
 820 825 830
 Ile Glu Ile Phe Phe Ser Asn His Cys Pro Leu Trp Tyr Gly Tyr Gly
 835 840 845
 Gly Gly Leu Lys Phe Leu Glu Arg Phe Ser Tyr Ile Asn Ser Ile Val
 850 855 860
 Tyr Pro Trp Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Leu Pro Ala
 865 870 875 880
 Ile Cys Leu Leu Thr Gly Lys Phe Ile Thr Pro Glu Leu Asn Asn Val
 885 890 895
 Ala Ser Leu Trp Phe Met Ser Leu Phe Ile Cys Ile Phe Ala Thr Ser
 900 905 910
 Ile Leu Glu Met Arg Trp Ser Gly Val Gly Ile Asp Asp Trp Trp Arg
 915 920 925
 Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ser His Leu Phe Ala
 930 935 940
 Val Phe Gln Gly Leu Leu Lys Val Ile Ala Gly Val Asp Thr Ser Phe
 945 950 955 960
 Thr Val Thr Ser Lys Gly Gly Asp Asp Glu Glu Phe Ser Glu Leu Tyr
 965 970 975
 Thr Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Leu
 980 985 990
 Leu Asn Phe Ile Gly Val Val Ala Gly Val Ser Asn Ala Ile Asn Asn
 995 1000 1005
 Gly Tyr Glu Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe
 1010 1015 1020
 Trp Val Ile Val His Leu Tyr Pro Phe Leu Lys Gly Leu Val Gly Arg
 1025 1030 1035 1040
 Gln Asn Arg Thr Pro Thr Ile Val Ile Val Trp Ser Ile Leu Leu Ala
 1045 1050 1055
 Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp Pro Phe Leu Ala Lys
 1060 1065 1070
 Asp Asp Gly Pro Leu Leu Glu Glu Cys Gly Leu Asp Cys Asn
 1075 1080 1085

<210> 11
 <211> 1138
 <212> DNA
 <213> Oryza sativa

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caccggaagg cgggcggcat gaacgcgcc ttcctctcg acctcgactg cgactactac 660
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<210> 12
<211> 341
<212> PRT
<213> Oryza sativa

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Arg Ser Arg Arg Ser Pro Arg Arg Thr Pro Cys Cys Pro Tyr Ile Leu
      20             25             30

Ala Ala Gly Tyr Pro Ala Gly Lys Val Thr Cys Tyr Ile Ser Asp Asp
      35             40             45

Ala Gly Ala Glu Val Thr Arg Asn Ala Val Val Glu Ala Ala Arg Phe
      50             55             60

Ala Ala Leu Trp Val Ser Phe Cys Arg Lys His Gly Val Glu Pro Arg
      65             70             75             80

Asn Leu Glu Ala Tyr Phe Asn Ala Gly Glu Gly Gly Gly Gly Lys Ala
      85             90             95

Lys Val Val Ala Arg Gly Ser Tyr Arg Gly Met Ala Trp Pro Glu Leu
      100            105            110

Val Arg Asp Arg Arg Arg Val Arg Arg Glu Tyr Glu Glu Met Arg Leu
      115            120            125

Arg Ile Asp Ala Leu Gln Ala Ala Asp Ala Arg Arg Arg Arg Gly
      130            135            140

Ala Ala Asp Asp His Ala Gly Val Val Gln Val Leu Ile Asp Phe Ala
      145            150            155            160

Gly Ser Val Pro Gln Leu Gly Val Ala Asn Gly Ser Lys Leu Ile Asp
      165            170            175

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Val Ala Ser Val Asp Val Cys Leu Pro Ala Leu Val Tyr Val Cys Arg
 180 185 190
 Glu Lys Arg Arg Gly His Ala His His Arg Lys Ala Gly Ala Met Asn
 195 200 205
 Ala Pro Phe Ile Leu Asp Leu Asp Cys Asp Tyr Tyr Val Asn Asn Ser
 210 215 220
 Gln Ala Leu Arg Ala Gly Ile Cys Phe Met Ile Glu Arg Gly Gly Gly
 225 230 235 240
 Gly Ala Ala Glu Asp Ala Gly Ala Val Ala Phe Val Gln Phe Pro Gln
 245 250 255
 Arg Val Asp Gly Val Asp Pro Gly Asp Arg Tyr Ala Asn His Asn Arg
 260 265 270
 Val Leu Phe Asp Cys Thr Glu Leu Gly Leu Asp Gly Leu Gln Gly Pro
 275 280 285
 Ile Tyr Val Gly Thr Gly Cys Leu Phe Arg Arg Val Ala Leu Tyr Ser
 290 295 300
 Val Asp Leu Pro Arg Trp Arg Pro Arg Arg Ser Leu Gly Cys Arg Leu
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 Leu Gly Glu Asp Glu Arg Leu Trp Ser Arg Met Lys Gln Met Val Ile
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 Leu Ser Gly Pro Arg
 340

<210> 13
 <211> 3517
 <212> DNA
 <213> Glycine max

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<210> 14
<211> 1039
<212> PRT
<213> Glycine max

<220>
<221> UNSURE
<222> (201)
<223> xaa = any amino acid

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Asp Gly Gln Val Cys Glu Ile Cys Gly Asp Gly Val Gly Leu Thr Val
 35              40              45

Asp Gly Asp Leu Phe Val Ala Cys Asn Glu Cys Gly Phe Pro Val Cys

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Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Ser His Leu Cys Pro 65 70 75 80		
Gln Cys Lys Thr Arg Tyr Lys Arg Leu Lys Gly Ser Pro Arg Val Glu 85 90 95		
Gly Asp Asp Asp Glu Glu Asp Val Asp Asp Ile Glu His Glu Phe Asn 100 105 110		
Ile Asp Glu Gln Lys Asn Lys His Gly Gln Val Ala Glu Ala Met Leu 115 120 125		
His Gly Arg Met Ser Tyr Gly Arg Gly Pro Glu Asp Asp Asp Asn Ser 130 135 140		
Gln Phe Pro Thr Pro Val Ile Ala Gly Gly Arg Ser Arg Pro Val Ser 145 150 155 160		
Gly Glu Phe Pro Ile Ser Ser Asn Ala Tyr Gly Asp Gln Met Leu Ser 165 170 175		
Ser Ser Leu His Lys Arg Val His Pro Tyr Pro Val Ser Glu Pro Gly 180 185 190		
Ser Ala Arg Trp Asp Glu Lys Lys Xaa Asp Gly Trp Lys Asp Arg Met 195 200 205		
Asp Asp Trp Lys Leu Gln Gln Gly Asn Leu Gly Pro Glu Pro Asp Glu 210 215 220		
Asp Pro Asp Ala Ala Met Leu Asp Glu Ala Arg Gln Pro Leu Ser Arg 225 230 235 240		
Lys Val Pro Ile Ala Ser Ser Lys Ile Asn Pro Tyr Arg Met Val Ile 245 250 255		
Val Ala Arg Leu Val Ile Leu Ala Phe Phe Leu Arg Tyr Arg Leu Met 260 265 270		
Asn Pro Val His Asp Ala Leu Gly Leu Trp Leu Thr Ser Ile Ile Cys 275 280 285		
Glu Ile Trp Phe Ala Phe Ser Trp Ile Leu Asp Gln Phe Pro Lys Trp 290 295 300		
Phe Pro Ile Asp Arg Glu Thr Tyr Leu Asp Arg Leu Ser Ile Arg Tyr 305 310 315 320		
Glu Arg Glu Gly Glu Pro Asn Met Leu Ala Pro Val Asp Val Phe Val 325 330 335		
Ser Thr Val Asp Pro Met Lys Glu Pro Pro Leu Val Thr Ala Asn Thr 340 345 350		
Val Leu Ser Ile Leu Ala Met Asp Tyr Pro Val Asp Lys Ile Ser Cys 355 360 365		
Tyr Ile Ser Asp Asp Gly Ala Ser Met Cys Thr Phe Glu Ser Leu Ser		

370	375	380
Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe Cys Lys Lys Phe 385 390 395 400		
Ser Ile Glu Pro Arg Ala Pro Glu Met Tyr Phe Ser Glu Lys Ile Asp 405 410 415		
Tyr Leu Lys Asp Lys Val Gln Pro Thr Phe Val Lys Glu Arg Arg Ala 420 425 430		
Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val 435 440 445		
Ala Lys Ala Gln Lys Val Pro Gln Gly Gly Trp Ile Met Gln Asp Gly 450 455 460		
Thr Pro Trp Pro Gly Asn Asn Thr Lys Asp His Pro Gly Met Ile Gln 465 470 475 480		
Val Phe Leu Gly Ser Ser Gly Gly Leu Asp Thr Glu Gly Asn Gln Leu 485 490 495		
Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Phe Gln His 500 505 510		
His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ser Ala Val 515 520 525		
Leu Thr Asn Ala Pro Phe Met Leu Asn Leu Asp Cys Asp His Tyr Val 530 535 540		
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Gln Thr Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln Arg Phe Asp 565 570 575		
Gly Ile Asp Thr His Asp Arg Tyr Ala Asn Arg Asn Thr Val Phe Phe 580 585 590		
Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro Val Tyr Val 595 600 605		
Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr Gly Tyr Asn Pro 610 615 620		
Pro Lys Gly Pro Lys Arg Pro Lys Met Val Ser Cys Asp Cys Cys Pro 625 630 635 640		
Cys Phe Gly Ser Arg Lys Lys Tyr Lys Glu Lys Asn Asp Ala Asn Gly 645 650 655		
Glu Ala Ala Ser Leu Lys Gly Met Asp Asp Asp Lys Glu Val Leu Met 660 665 670		
Ser Gln Met Asn Phe Glu Lys Lys Phe Gly Gln Ser Ser Ile Phe Val 675 680 685		
Thr Ser Thr Leu Met Glu Glu Gly Gly Val Pro Pro Ser Ser Ser Pro		

690					695					700					
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Asp	Lys	Thr	Glu	Trp	Gly	Leu	Glu	Leu	Gly	Trp	Ile	Tyr	Gly	Ser	Ile
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Ile	Asn	Leu	Ser	Asp	Arg	Leu	Asn	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly
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Lys	Glu	Lys	Lys	Leu	Lys	Trp	Leu	Glu	Arg	Phe	Ala	Tyr	Ala	Asn	Thr
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Pro	Ala	Val	Cys	Leu	Leu	Thr	Asp	Lys	Phe	Ile	Met	Pro	Pro	Ile	Ser
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Thr	Gly	Ile	Leu	Glu	Leu	Lys	Trp	Ser	Gly	Val	Ser	Ile	Glu	Glu	Trp
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Phe	Ala	Val	Ile	Gln	Gly	Leu	Leu	Lys	Val	Leu	Ala	Gly	Ile	Asp	Thr
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Asn	Phe	Thr	Val	Thr	Ser	Lys	Ala	Thr	Asp	Asp	Glu	Glu	Phe	Gly	Glu
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Leu	Tyr	Thr	Phe	Lys	Trp	Thr	Thr	Leu	Leu	Ile	Pro	Pro	Thr	Thr	Ile
		930				935					940				
Leu	Ile	Ile	Asn	Ile	Val	Gly	Val	Val	Ala	Gly	Ile	Ser	Asp	Ala	Ile
	945					950				955					960
Asn	Asn	Gly	Tyr	Gln	Ser	Trp	Gly	Pro	Leu	Phe	Gly	Lys	Leu	Phe	Phe
				965					970					975	
Ser	Phe	Trp	Val	Ile	Val	His	Leu	Tyr	Pro	Phe	Leu	Lys	Gly	Leu	Met
			980					985					990		
Gly	Arg	Gln	Asn	Arg	Thr	Pro	Thr	Ile	Val	Val	Ile	Trp	Ser	Val	Leu
		995					1000					1005			
Leu	Ala	Ser	Ile	Phe	Ser	Leu	Leu	Trp	Val	Arg	Ile	Asp	Pro	Phe	Val

1010 1015 1020

Leu Lys Thr Lys Gly Pro Asp Thr Lys Leu Cys Gly Ile Asn Cys
1025 1030 1035

<210> 15
<211> 2125
<212> DNA
<213> Glycine max

<400> 15

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<211> 610
<212> PRT
<213> Glycine max

<400> 16

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			20					25					30		

Val Phe Leu Gly His Ser Gly Gly Leu Asp Thr Asp Gly Asn Glu Leu
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 Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Phe Gln His
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 His Lys Lys Ala Gly Ala Met Asn Ala Leu Ile Arg Val Ser Ala Val
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 Asn Asn Ser Lys Ala Leu Lys Glu Ala Met Cys Phe Met Met Asp Pro
 100 105 110
 Val Leu Gly Lys Lys Thr Cys Tyr Val Gln Phe Pro Gln Arg Phe Asp
 115 120 125
 Gly Ile Asp Leu His Asp Arg Tyr Ala Asn Arg Asn Ile Val Phe Phe
 130 135 140
 Asp Ile Asn Met Lys Gly Gln Asp Gly Val Gln Gly Pro Val Tyr Val
 145 150 155 160
 Gly Thr Gly Cys Cys Phe Asn Arg Gln Ala Leu Tyr Gly Tyr Asp Pro
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 Val Leu Thr Glu Glu Asp Leu Glu Pro Asn Ile Ile Val Lys Ser Cys
 180 185 190
 Cys Gly Ser Arg Lys Lys Gly Lys Gly Asn Lys Lys Tyr Ser Asp
 195 200 205
 Lys Lys Lys Ala Met Gly Arg Thr Glu Ser Thr Val Pro Ile Phe Asn
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 Met Glu Asp Ile Glu Glu Gly Val Glu Gly Tyr Asp Asp Glu Arg Thr
 225 230 235 240
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 260 265 270
 Thr Asn Pro Ala Thr Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys
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 Gly Tyr Glu Asp Lys Thr Glu Trp Gly Lys Glu Ile Gly Trp Ile Tyr
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 Gly Ser Val Thr Glu Asp Ile Leu Thr Gly Phe Lys Met His Ala Arg
 305 310 315 320
 Gly Trp Ile Ser Ile Tyr Cys Met Pro Pro Arg Pro Ala Phe Lys Gly
 325 330 335
 Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp
 340 345 350

Ala Leu Gly Ser Ile Glu Ile Phe Leu Ser Arg His Cys Pro Leu Trp
355 360 365

Tyr Gly Tyr Asn Gly Lys Leu Lys Pro Leu Met Arg Leu Ala Tyr Ile
370 375 380

Asn Thr Ile Val Tyr Pro Phe Thr Ser Ile Pro Leu Ile Ala Tyr Cys
385 390 395 400

Thr Leu Pro Ala Phe Cys Leu Leu Thr Asn Lys Phe Ile Ile Pro Glu
405 410 415

Ile Ser Asn Phe Ala Ser Met Trp Phe Ile Leu Leu Phe Val Ser Ile
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Phe Thr Thr Ser Ile Leu Glu Leu Arg Trp Ser Gly Val Ser Ile Glu
435 440 445

Asp Trp Trp Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Thr Ser Ala
450 455 460

His Leu Phe Ala Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Ile
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Asp Thr Asn Phe Thr Val Thr Ser Lys Ala Ser Asp Glu Asp Gly Asp
485 490 495

Phe Ala Glu Leu Tyr Val Phe Lys Trp Thr Ser Leu Leu Ile Pro Pro
500 505 510

Thr Thr Val Leu Ile Val Asn Leu Val Gly Ile Val Ala Gly Val Ser
515 520 525

Tyr Ala Ile Asn Ser Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys
530 535 540

Leu Phe Phe Ala Ile Trp Val Ile Ala His Leu Tyr Pro Phe Leu Lys
545 550 555 560

Gly Leu Leu Gly Arg Gln Asn Arg Thr Pro Thr Ile Val Ile Val Trp
565 570 575

Ser Val Leu Leu Ala Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp
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Pro Phe Thr Ser Asp Ser Asn Lys Leu Thr Asn Gly Gln Cys Gly Ile
595 600 605

Asn Cys
610

<210> 17
<211> 2890
<212> DNA
<213> Glycine max

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aaaaaaaaaa						2890

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 <211> 793
 <212> PRT
 <213> Glycine max

<400> 18
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Pro Lys Trp Tyr Pro Ile Gln Arg Glu Thr Tyr Leu Asp Arg Leu Ser
35 40 45

Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Glu Leu Ser Ser Val Asp
50 55 60

Val Phe Val Ser Thr Val Asp Pro Met Lys Glu Pro Pro Leu Ile Thr
65 70 75 80

Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp Tyr Pro Val Asp Lys
85 90 95

Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu
100 105 110

Ala Leu Ser Glu Thr Ser Glu Phe Ala Arg Arg Trp Val Pro Phe Cys
115 120 125

Lys Lys Tyr Asn Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gly Gln
130 135 140

Lys Met Asp Tyr Leu Lys Asn Lys Val His Pro Ala Phe Val Arg Glu
145 150 155 160

Arg Arg Ala Met Lys Arg Asp Tyr Glu Glu Phe Lys Val Arg Ile Asn
165 170 175

Ser Leu Val Ala Thr Ala Gln Lys Val Pro Glu Asp Gly Trp Thr Met
180 185 190

Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn Val Arg Asp His Pro Gly
195 200 205

Met Ile Gln Val Phe Leu Gly Gln Asp Gly Val Arg Asp Val Glu Gly
210 215 220

Asn Glu Leu Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly
225 230 235 240

Phe Asp His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Ala
245 250 255

Ser Ala Ile Ile Thr Asn Ala Pro Tyr Leu Leu Asn Val Asp Cys Asp
260 265 270

His Tyr Ile Asn Asn Ser Lys Ala Leu Arg Glu Ala Met Cys Phe Met
275 280 285

Met Asp Pro Gln Leu Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln
290 295 300

Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr Ser Asn Arg Asn Val
305 310 315 320

Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro
325 330 335

Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg Tyr Ala Leu Tyr Gly
340 345 350

Tyr Asp Ala Pro Ala Lys Lys Lys Pro Pro Ser Lys Thr Cys Asn Cys
 355 360 365
 Trp Pro Lys Trp Cys Cys Leu Cys Cys Gly Ser Arg Lys Lys Lys Asn
 370 375 380
 Ala Asn Ser Lys Lys Glu Lys Lys Arg Lys Val Lys His Ser Glu Ala
 385 390 395 400
 Ser Lys Gln Ile His Ala Leu Glu Asn Ile Glu Ala Gly Asn Glu Gly
 405 410 415
 Thr Asn Asn Glu Lys Thr Ser Asn Leu Thr Gln Thr Lys Leu Glu Lys
 420 425 430
 Arg Phe Gly Gln Ser Pro Val Phe Val Ala Ser Thr Leu Leu Asp Asp
 435 440 445
 Gly Gly Val Pro His Gly Val Ser Pro Ala Ser Leu Leu Lys Glu Ala
 450 455 460
 Ile Gln Val Ile Ser Cys Gly Tyr Glu Asp Lys Thr Glu Trp Gly Lys
 465 470 475 480
 Glu Val Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu Thr Gly
 485 490 495
 Phe Lys Met His Cys His Gly Trp Arg Ser Val Tyr Cys Ile Pro Lys
 500 505 510
 Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu
 515 520 525
 His Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu Ile Phe Phe Ser
 530 535 540
 Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly Leu Lys Leu Leu
 545 550 555 560
 Glu Arg Phe Ser Tyr Ile Asn Ser Val Val Tyr Pro Trp Thr Ser Leu
 565 570 575
 Pro Leu Leu Val Tyr Cys Thr Leu Pro Ala Ile Cys Leu Leu Thr Gly
 580 585 590
 Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Ser Leu Val Phe Met
 595 600 605
 Ala Leu Phe Ile Ser Ile Ala Ala Thr Gly Ile Leu Glu Met Gln Trp
 610 615 620
 Gly Gly Val Ser Ile Asp Asp Trp Trp Arg Asn Glu Gln Phe Trp Val
 625 630 635 640
 Ile Gly Gly Val Ser Ser His Leu Phe Ala Leu Phe Gln Gly Leu Leu
 645 650 655
 Lys Val Leu Ala Gly Val Asn Thr Asn Phe Thr Val Thr Ser Lys Ala
 660 665 670

Ala Asp Asp Gly Glu Phe Ser Glu Leu Tyr Ile Phe Lys Trp Thr Ser
675 680 685

Leu Leu Ile Pro Pro Met Thr Leu Leu Ile Met Asn Ile Val Gly Val
690 695 700

Val Val Gly Ile Ser Asp Ala Ile Asn Asn Gly Tyr Asp Ser Trp Gly
705 710 715 720

Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val Ile Leu His Leu
725 730 735

Tyr Pro Phe Leu Lys Gly Leu Leu Gly Lys Gln Asp Arg Met Pro Thr
740 745 750

Ile Ile Leu Val Trp Ser Ile Leu Leu Ala Ser Ile Leu Thr Leu Met
755 760 765

Trp Val Arg Ile Asn Pro Phe Val Ser Arg Asp Gly Pro Val Leu Glu
770 775 780

Ile Cys Gly Leu Asn Cys Asp Glu Ser
785 790

<210> 19
<211> 1742
<212> DNA
<213> Triticum aestivum

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<223> n = a, c g or t

<220>
<221> unsure
<222> (271)
<223> n = a, c g or t

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actgtctttt ttgatattaa cttgaggggc cttgacggca ttcaaggacc agtttatgtg 180
ggaactgggt gtgttttcaa cagaacggct atctatgggt atgagcccc aattaaggcg 240
aagaagccag gtttcttggc atcattatgt nggggcaaga agaaggcaag caagtcaaag 300
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accaacttca ctgtcacctc aaaggctaag gatgaagaag gcgactttgc tgagctctac 1200

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atgttcaagt ggacgacgct tcttatccct ccgacgacca ttttgatcat taacatggtc 1260
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aa 1742

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<210> 20
<211> 506
<212> PRT
<213> Triticum aestivum

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<220>
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<222> (88)
<223> xaa = any amino acid

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Tyr Ala Asn Arg Asn Thr Val Phe Phe Asp Ile Asn Leu Arg Gly Leu
      35             40             45

Asp Gly Ile Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Val Phe Asn
      50             55             60

Arg Thr Ala Ile Tyr Gly Tyr Glu Pro Pro Ile Lys Ala Lys Lys Pro
      65             70             75             80

Gly Phe Leu Ala Ser Leu Cys Xaa Gly Lys Lys Lys Ala Ser Lys Ser
      85             90             95

Lys Lys Arg Ser Ser Asp Lys Lys Lys Ser Asn Lys His Val Asp Ser
      100            105            110

Ser Val Pro Val Phe Asn Leu Glu Asp Ile Glu Glu Gly Val Glu Gly
      115            120            125

Ala Gly Phe Asp Asp Glu Lys Ser Val Leu Met Ser Gln Met Ser Leu
      130            135            140

Glu Lys Arg Phe Gly Gln Ser Ala Ala Phe Val Ala Ser Thr Leu Met
      145            150            155            160

Glu Tyr Gly Gly Val Pro Gln Ser Ser Thr Pro Glu Ser Leu Leu Lys
      165            170            175

Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys Ser Glu Trp
      180            185            190

Gly Thr Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu
      195            200            205

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Thr Gly Phe Lys Met His Ala Arg Gly Trp Arg Ser Ile Tyr Cys Met
 210 215 220
 Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp
 225 230 235 240
 Arg Leu Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu Ile Leu
 245 250 255
 Phe Ser Arg His Cys Pro Leu Trp Tyr Gly Tyr Gly Gly Arg Leu Lys
 260 265 270
 Phe Leu Glu Arg Phe Ala Tyr Ile Asn Thr Thr Ile Tyr Pro Leu Thr
 275 280 285
 Ser Leu Pro Leu Leu Val Tyr Cys Ile Leu Pro Ala Ile Cys Leu Leu
 290 295 300
 Thr Gly Lys Phe Ile Met Pro Glu Ile Ser Asn Leu Ala Ser Ile Trp
 305 310 315 320
 Phe Ile Ala Leu Phe Leu Ser Ile Phe Ala Thr Gly Ile Leu Glu Met
 325 330 335
 Arg Trp Ser Gly Val Gly Ile Asp Glu Trp Trp Arg Asn Glu Gln Phe
 340 345 350
 Trp Val Ile Gly Gly Ile Ser Ala His Leu Phe Ala Val Phe Gln Gly
 355 360 365
 Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr Val Thr Ser
 370 375 380
 Lys Ala Asn Asp Glu Glu Gly Asp Phe Ala Glu Leu Tyr Met Phe Lys
 385 390 395 400
 Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Ile Leu Ile Ile Asn Met
 405 410 415
 Val Gly Val Val Ala Gly Thr Ser Tyr Ala Ile Asn Ser Gly Tyr Gln
 420 425 430
 Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe Trp Val Ile
 435 440 445
 Val His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg Gln Asn Arg
 450 455 460
 Thr Pro Thr Ile Val Ile Val Trp Ala Val Leu Leu Ala Ser Ile Phe
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 Ser Leu Leu Trp Val Arg Val Asp Pro Phe Thr Thr Arg Leu Ala Gly
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 Pro Asn Ile Gln Thr Cys Gly Ile Asn Cys
 500 505

<210> 21
 <211> 1029

<212> DNA
<213> Triticum aestivum

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gcctggaaa 1029

<210> 22
<211> 340
<212> PRT
<213> Triticum aestivum

<400> 22
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His Ala Leu Val Pro Ser Tyr Met Ser Gly Gly Gly Gly Gly Gly Lys
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Arg Ile His Pro Leu Pro Phe Ala Asp Pro Asn Leu Pro Val Gln Pro
35 40 45
Arg Ser Met Asp Pro Ser Lys Asp Leu Ala Ala Tyr Gly Tyr Gly Ser
50 55 60
Val Ala Trp Lys Glu Arg Met Glu Gly Trp Lys Gln Lys Gln Glu Arg
65 70 75 80
Leu Gln His Val Arg Ser Glu Gly Gly Gly Asp Trp Asp Gly Asp Asp
85 90 95
Ala Asp Leu Pro Leu Met Asp Glu Ala Arg Gln Pro Leu Ser Arg Lys
100 105 110
Val Pro Ile Ser Ser Ser Arg Ile Asn Pro Tyr Arg Met Ile Ile Val
115 120 125
Ile Arg Leu Val Val Leu Gly Phe Phe Phe His Tyr Arg Val Met His
130 135 140
Pro Ala Lys Asp Ala Phe Ala Leu Trp Leu Ile Ser Val Ile Cys Glu
145 150 155 160
Ile Trp Phe Ala Met Ser Cys Ile Leu Asp Gln Phe Pro Lys Trp Phe

165	170	175
Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu Ser Leu Arg Phe Asp		
180	185	190
Lys Glu Gly Gln Pro Ser Gln Leu Ala Pro Ile Asp Phe Phe Val Ser		
195	200	205
Thr Val Asp Pro Thr Lys Glu Pro Pro Leu Val Thr Ala Asn Thr Val		
210	215	220
Leu Ser Ile Leu Ser Val Asp Tyr Pro Val Glu Lys Val Ser Cys Tyr		
225	230	235
Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu Ala Leu Ser Glu		
245	250	255
Thr Ser Glu Phe Ala Lys Lys Trp Val Pro Phe Ser Lys Lys Phe Asn		
260	265	270
Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gln Gln Lys Ile Asp Tyr		
275	280	285
Leu Lys Asp Lys Val Ala Ala Ser Phe Val Arg Glu Arg Arg Ala Met		
290	295	300
Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala		
305	310	315
Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr Met Gln Asp Gly Ser		
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Pro Trp Pro Gly		
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 35 40 45
 Ala Glu Thr Gly Asp Val Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
 50 55 60
 Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Lys Asp Gly Thr Gln Cys
 65 70 75 80
 Cys Pro Gln Cys Lys Thr Arg Phe Arg Arg His Arg Gly Ser Pro Arg
 85 90 95
 Val Glu Gly Asp Glu Asp Glu Asp Asp Val Asp Asp Ile Glu Asn Glu

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Phe	Asn	Tyr	Ala	Gln	Gly	Ala	Asn	Lys	Ala	Arg	His	Gln	Arg	His	Gly		
		115					120					125					
Glu	Glu	Phe	Ser	Ser	Ser	Ser	Arg	His	Glu	Ser	Gln	Pro	Ile	Pro	Leu		
	130					135					140						
Leu	Thr	His	Gly	His	Thr	Val	Ser	Gly	Glu	Ile	Arg	Thr	Pro	Asp	Thr		
145					150					155					160		
Gln	Ser	Val	Arg	Thr	Thr	Ser	Gly	Pro	Leu	Gly	Pro	Ser	Asp	Arg	Asn		
				165					170					175			
Ala	Ile	Ser	Ser	Pro	Tyr	Ile	Asp	Pro	Arg	Gln	Pro	Val	Pro	Val	Arg		
			180					185					190				
Ile	Val	Asp	Pro	Ser	Lys	Asp	Leu	Asn	Ser	Tyr	Gly	Leu	Gly	Asn	Val		
		195					200					205					
Asp	Trp	Lys	Glu	Arg	Val	Glu	Gly	Trp	Lys	Leu	Lys	Gln	Glu	Lys	Asn		
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Met	Leu	Gln	Met	Thr	Gly	Lys	Tyr	His	Glu	Gly	Lys	Gly	Gly	Glu	Ile		
225					230					235					240		
Glu	Gly	Thr	Gly	Ser	Asn	Gly	Glu	Glu	Leu	Gln	Met	Ala	Asp	Asp	Thr		
				245					250					255			
Arg	Leu	Pro	Met	Ser	Arg	Val	Val	Pro	Ile	Pro	Ser	Ser	Arg	Leu	Thr		
			260					265					270				
Pro	Tyr	Arg	Val	Val	Ile	Ile	Leu	Arg	Leu	Ile	Ile	Leu	Cys	Phe	Phe		
		275					280					285					
Leu	Gln	Tyr	Arg	Thr	Thr	His	Pro	Val	Lys	Asn	Ala	Tyr	Pro	Leu	Trp		
	290					295					300						
Leu	Thr	Ser	Val	Ile	Cys	Glu	Ile	Trp	Phe	Ala	Phe	Ser	Trp	Leu	Leu		
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Asp	Gln	Phe	Pro	Lys	Trp	Tyr	Pro	Ile	Asn	Arg	Glu	Thr	Tyr	Leu	Asp		
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Arg	Leu	Ala	Ile	Arg	Tyr	Asp	Arg	Asp	Gly	Glu	Pro	Ser	Gln	Leu	Val		
			340					345					350				
Pro	Val	Asp	Val	Phe	Val	Ser	Thr	Val	Asp	Pro	Leu	Lys	Glu	Pro	Pro		
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Leu	Val	Thr	Ala	Asn	Thr	Val	Leu	Ser	Ile	Leu	Ser	Val	Asp	Tyr	Pro		
	370					375					380						
Val	Asp	Lys	Val	Ala	Cys	Tyr	Val	Ser	Asp	Asp	Gly	Ser	Ala	Met	Leu		
385					390					395					400		
Thr	Phe	Glu	Ser	Leu	Ser	Glu	Thr	Ala	Glu	Phe	Ala	Lys	Lys	Trp	Val		
				405					410					415			
Pro	Phe	Cys	Lys	Lys	Phe	Asn	Ile	Glu	Pro	Arg	Ala	Pro	Glu	Phe	Tyr		

420					425					430						
Phe	Ala	Gln	Lys	Ile	Asp	Tyr	Leu	Lys	Asp	Lys	Ile	Gln	Pro	Ser	Phe	
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Val	Lys	Glu	Arg	Arg	Ala	Met	Lys	Arg	Glu	Tyr	Glu	Glu	Phe	Lys	Val	
450					455					460						
Arg	Ile	Asn	Ala	Leu	Val	Ala	Lys	Ala	Gln	Lys	Ile	Pro	Glu	Glu	Gly	
465					470					475					480	
Trp	Thr	Met	Gln	Asp	Gly	Thr	Pro	Trp	Pro	Gly	Asn	Asn	Thr	Arg	Asp	
					485					490					495	
His	Pro	Gly	Met	Ile	Gln	Val	Phe	Leu	Gly	His	Ser	Gly	Gly	Leu	Asp	
500										505					510	
Thr	Asp	Gly	Asn	Glu	Leu	Pro	Arg	Leu	Ile	Tyr	Val	Ser	Arg	Glu	Lys	
515					520					525						
Arg	Pro	Gly	Phe	Gln	His	His	Lys	Lys	Ala	Gly	Ala	Met	Asn	Ala	Leu	
530					535					540						
Ile	Arg	Val	Ser	Ala	Val	Leu	Thr	Asn	Gly	Ala	Tyr	Leu	Leu	Asn	Val	
545					550					555					560	
Asp	Cys	Asp	His	Tyr	Phe	Asn	Asn	Ser	Lys	Ala	Ile	Lys	Glu	Ala	Met	
					565					570					575	
Cys	Phe	Met	Met	Asp	Pro	Ala	Ile	Gly	Lys	Lys	Cys	Cys	Tyr	Val	Gln	
580										585					590	
Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Leu	His	Asp	Arg	Tyr	Ala	Asn	
595					600					605						
Arg	Asn	Ile	Val	Phe	Phe	Asp	Ile	Asn	Met	Lys	Gly	Leu	Asp	Gly	Ile	
610					615					620						
Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Cys	Cys	Phe	Asn	Arg	Gln	Ala	
625					630					635					640	
Leu	Tyr	Gly	Tyr	Asp	Pro	Val	Leu	Thr	Glu	Glu	Asp	Leu	Glu	Pro	Asn	
					645					650					655	
Ile	Ile	Val	Lys	Ser	Cys	Cys	Gly	Ser	Arg	Lys	Lys	Gly	Lys	Ser	Ser	
660					665					670						
Lys	Lys	Tyr	Asn	Tyr	Glu	Lys	Arg	Arg	Gly	Ile	Asn	Arg	Ser	Asp	Ser	
675					680					685						
Asn	Ala	Pro	Leu	Phe	Asn	Met	Glu	Asp	Ile	Asp	Glu	Gly	Phe	Glu	Gly	
690					695					700						
Tyr	Asp	Asp	Glu	Arg	Ser	Ile	Leu	Met	Ser	Gln	Arg	Ser	Val	Glu	Lys	
705					710					715					720	
Arg	Phe	Gly	Gln	Ser	Pro	Val	Phe	Ile	Ala	Ala	Thr	Phe	Met	Glu	Gln	
725					730					735						
Gly	Gly	Ile	Pro	Pro	Thr	Thr	Asn	Pro	Ala	Thr	Leu	Leu	Lys	Glu	Ala	

740	745	750
Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys Thr Glu Trp Gly Lys 755 760 765		
Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu Thr Gly 770 775 780		
Phe Lys Met His Ala Arg Gly Trp Ile Ser Ile Tyr Cys Asn Pro Pro 785 790 795 800		
Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu 805 810 815		
Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Ile Glu Ile Leu Leu Ser 820 825 830		
Arg His Cys Pro Ile Trp Tyr Gly Tyr His Gly Arg Leu Arg Leu Leu 835 840 845		
Glu Arg Ile Ala Tyr Ile Asn Thr Ile Val Tyr Pro Ile Thr Ser Ile 850 855 860		
Pro Leu Ile Ala Tyr Cys Ile Leu Pro Ala Phe Cys Leu Ile Thr Asp 865 870 875 880		
Arg Phe Ile Ile Pro Glu Ile Ser Asn Tyr Ala Ser Ile Trp Phe Ile 885 890 895		
Leu Leu Phe Ile Ser Ile Ala Val Thr Gly Ile Leu Glu Leu Arg Trp 900 905 910		
Ser Gly Val Ser Ile Glu Asp Trp Trp Arg Asn Glu Gln Phe Trp Val 915 920 925		
Ile Gly Gly Thr Ser Ala His Leu Phe Ala Val Phe Gln Gly Leu Leu 930 935 940		
Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr Val Thr Ser Lys Ala 945 950 955 960		
Thr Asp Glu Asp Gly Asp Phe Ala Glu Leu Tyr Ile Phe Lys Trp Thr 965 970 975		
Ala Leu Leu Ile Pro Pro Thr Thr Val Leu Leu Val Asn Leu Ile Gly 980 985 990		
Ile Val Ala Gly Val Ser Tyr Ala Val Asn Ser Gly Tyr Gln Ser Trp 995 1000 1005		
Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Leu Trp Val Ile Ala His 1010 1015 1020		
Leu Tyr Pro Phe Leu Lys Gly Leu Leu Gly Arg Gln Asn Arg Thr Pro 1025 1030 1035 1040		
Thr Ile Val Ile Val Trp Ser Val Leu Leu Ala Ser Ile Phe Ser Leu 1045 1050 1055		
Leu Trp Val Arg Ile Asn Pro Phe Val Asp Ala Asn Pro Asn Ala Asn		

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 Asn Phe Asn Gly Lys Gly Gly Val Phe
 1075 1080

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 Glu Leu Ser Gly Gln Thr Cys Gln Ile Cys Gly Asp Glu Ile Glu Leu
 35 40 45

 Thr Val Ser Ser Glu Leu Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
 50 55 60

 Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Asn Gln Ala
 65 70 75 80

 Cys Pro Gln Cys Lys Thr Arg Tyr Lys Arg Ile Lys Gly Ser Pro Arg
 85 90 95

 Val Asp Gly Asp Asp Glu Glu Glu Glu Asp Ile Asp Asp Leu Glu Tyr
 100 105 110

 Glu Phe Asp His Gly Met Asp Pro Glu His Ala Ala Glu Ala Ala Leu
 115 120 125

 Ser Ser Arg Leu Asn Thr Gly Arg Gly Gly Leu Asp Ser Ala Pro Pro
 130 135 140

 Gly Ser Gln Ile Pro Leu Leu Thr Tyr Cys Asp Glu Asp Ala Asp Met
 145 150 155 160

 Tyr Ser Asp Arg His Ala Leu Ile Val Pro Pro Ser Thr Gly Tyr Gly
 165 170 175

 Asn Arg Val Tyr Pro Ala Pro Phe Thr Asp Ser Ser Ala Pro Pro Gln
 180 185 190

 Ala Arg Ser Met Val Pro Gln Lys Asp Ile Ala Glu Tyr Gly Tyr Gly
 195 200 205

 Ser Val Ala Trp Lys Asp Arg Met Glu Val Trp Lys Arg Arg Gln Gly
 210 215 220

 Glu Lys Leu Gln Val Ile Lys His Glu Gly Gly Asn Asn Gly Arg Gly
 225 230 235 240

 Ser Asn Asp Asp Asp Glu Leu Asp Asp Pro Asp Met Pro Met Met Asp
 245 250 255

 Glu Gly Arg Gln Pro Leu Ser Arg Lys Leu Pro Ile Arg Ser Ser Arg

260										265										270										
Ile	Asn	Pro	Tyr	Arg	Met	Leu	Ile	Leu	Cys	Arg	Leu	Ala	Ile	Leu	Gly															
		275					280					285																		
Leu	Phe	Phe	His	Tyr	Arg	Ile	Leu	His	Pro	Val	Asn	Asp	Ala	Tyr	Gly															
	290					295					300																			
Leu	Trp	Leu	Thr	Ser	Val	Ile	Cys	Glu	Ile	Trp	Phe	Ala	Val	Ser	Trp															
305					310					315					320															
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Leu	Asp	Arg	Leu	Ser	Leu	Arg	Tyr	Glu	Lys	Glu	Gly	Lys	Pro	Ser	Gly															
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Leu	Ala	Pro	Val	Asp	Val	Phe	Val	Ser	Thr	Val	Asp	Pro	Leu	Lys	Glu															
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Pro	Pro	Leu	Ile	Thr	Ala	Asn	Thr	Val	Leu	Ser	Ile	Leu	Ala	Val	Asp															
		370				375					380																			
Tyr	Pro	Val	Asp	Lys	Val	Ala	Cys	Tyr	Val	Ser	Asp	Asp	Gly	Ala	Ala															
385					390					395					400															
Met	Leu	Thr	Phe	Glu	Ala	Leu	Ser	Asp	Thr	Ala	Glu	Phe	Ala	Arg	Lys															
				405					410					415																
Trp	Val	Pro	Phe	Cys	Lys	Lys	Phe	Asn	Ile	Glu	Pro	Arg	Ala	Pro	Glu															
			420					425					430																	
Trp	Tyr	Phe	Ser	Gln	Lys	Met	Asp	Tyr	Leu	Lys	Asn	Lys	Val	His	Pro															
		435					440					445																		
Ala	Phe	Val	Arg	Glu	Arg	Arg	Ala	Met	Lys	Arg	Asp	Tyr	Glu	Glu	Phe															
		450				455					460																			
Lys	Val	Lys	Ile	Asn	Ala	Leu	Val	Ala	Thr	Ala	Gln	Lys	Val	Pro	Glu															
465					470					475					480															
Glu	Gly	Trp	Thr	Met	Gln	Asp	Gly	Thr	Pro	Trp	Pro	Gly	Asn	Asn	Val															
				485					490					495																
Arg	Asp	His	Pro	Gly	Met	Ile	Gln	Val	Phe	Leu	Gly	His	Ser	Gly	Val															
			500					505					510																	
Arg	Asp	Thr	Asp	Gly	Asn	Glu	Leu	Pro	Arg	Leu	Val	Tyr	Val	Ser	Arg															
		515					520					525																		
Glu	Lys	Arg	Pro	Gly	Phe	Asp	His	His	Lys	Lys	Ala	Gly	Ala	Met	Asn															
		530				535					540																			
Ser	Leu	Ile	Arg	Val	Ser	Ala	Val	Leu	Ser	Asn	Ala	Pro	Tyr	Leu	Leu															
545					550					555					560															
Asn	Val	Asp	Cys	Asp	His	Tyr	Ile	Asn	Asn	Ser	Lys	Ala	Ile	Arg	Glu															
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Ser	Met	Cys	Phe	Met	Met	Asp	Pro	Gln	Ser	Gly	Lys	Lys	Val	Cys	Tyr															

580										585					590				
Val	Gln	Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Arg	His	Asp	Arg	Tyr				
		595					600					605							
Ser	Asn	Arg	Asn	Val	Val	Phe	Phe	Asp	Ile	Asn	Met	Lys	Gly	Leu	Asp				
	610					615					620								
Gly	Ile	Gln	Gly	Pro	Ile	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe	Arg	Arg				
625					630					635					640				
Gln	Ala	Leu	Tyr	Gly	Phe	Asp	Ala	Pro	Lys	Lys	Lys	Lys	Pro	Pro	Gly				
				645					650					655					
Lys	Thr	Cys	Asn	Cys	Trp	Pro	Lys	Trp	Cys	Cys	Leu	Cys	Cys	Gly	Leu				
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Arg	Lys	Lys	Ser	Lys	Thr	Lys	Ala	Lys	Asp	Lys	Lys	Thr	Asn	Thr	Lys				
		675					680					685							
Glu	Thr	Ser	Lys	Gln	Ile	His	Ala	Leu	Glu	Asn	Val	Asp	Glu	Gly	Val				
	690					695					700								
Ile	Val	Pro	Val	Ser	Asn	Val	Glu	Lys	Arg	Ser	Glu	Ala	Thr	Gln	Leu				
705					710					715					720				
Lys	Leu	Glu	Lys	Lys	Phe	Gly	Gln	Ser	Pro	Val	Phe	Val	Ala	Ser	Ala				
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Val	Leu	Gln	Asn	Gly	Gly	Val	Pro	Arg	Asn	Ala	Ser	Pro	Ala	Cys	Leu				
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Leu	Arg	Glu	Ala	Ile	Gln	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Asp	Lys	Thr				
		755					760					765							
Glu	Trp	Gly	Lys	Glu	Ile	Gly	Trp	Ile	Tyr	Gly	Ser	Val	Thr	Glu	Asp				
	770					775					780								
Ile	Leu	Thr	Gly	Phe	Lys	Met	His	Cys	His	Gly	Trp	Arg	Ser	Val	Tyr				
785					790					795					800				
Cys	Met	Pro	Lys	Arg	Ala	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile	Asn	Leu				
				805					810					815					
Ser	Asp	Arg	Leu	His	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	Val	Glu				
			820					825					830						
Ile	Phe	Leu	Ser	Arg	His	Cys	Pro	Ile	Trp	Tyr	Gly	Tyr	Gly	Gly	Gly				
		835					840					845							
Leu	Lys	Trp	Leu	Glu	Arg	Phe	Ser	Tyr	Ile	Asn	Ser	Val	Val	Tyr	Pro				
	850					855					860								
Trp	Thr	Ser	Leu	Pro	Leu	Ile	Val	Tyr	Cys	Ser	Leu	Pro	Ala	Val	Cys				
865					870					875					880				
Leu	Leu	Thr	Gly	Lys	Phe	Ile	Val	Pro	Glu	Ile	Ser	Asn	Tyr	Ala	Gly				
				885					890					895					
Ile	Leu	Phe	Met	Leu	Met	Phe	Ile	Ser	Ile	Ala	Val	Thr	Gly	Ile	Leu				

900	905	910
Glu Met Gln Trp Gly Gly Val Gly Ile Asp Asp Trp Trp Arg Asn Glu 915 920 925		
Gln Phe Trp Val Ile Gly Gly Ala Ser Ser His Leu Phe Ala Leu Phe 930 935 940		
Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asn Thr Asn Phe Thr Val 945 950 955 960		
Thr Ser Lys Ala Ala Asp Asp Gly Ala Phe Ser Glu Leu Tyr Ile Phe 965 970 975		
Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Ile Ile Asn 980 985 990		
Ile Ile Gly Val Ile Val Gly Val Ser Asp Ala Ile Ser Asn Gly Tyr 995 1000 1005		
Asp Ser Trp Gly Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val 1010 1015 1020		
Ile Val His Leu Tyr Pro Phe Leu Lys Gly Met Leu Gly Lys Gln Asp 1025 1030 1035 1040		
Lys Met Pro Thr Ile Ile Val Val Trp Ser Ile Leu Leu Ala Ser Ile 1045 1050 1055		
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Pro Val Leu Glu Ile Cys Gly Leu Asn Cys Gly Asn 1075 1080		
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Pro Glu Phe Tyr Phe Asn Glu Lys Ile Asp Tyr Leu Lys Asp Lys Val 20 25 30		
His Pro Ser Phe Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu 35 40 45		
Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala Lys Ala Gln Lys Lys 50 55 60		
Pro Glu Glu Gly Trp Val Met Gln Asp Gly Thr Pro Trp Pro Gly Asn 65 70 75 80		
Asn Thr Arg Asp His Pro Gly Met Ile Gln Val Tyr Leu Gly Ser Ala 85 90 95		
Gly Ala Leu Asp Val Asp Gly Lys Glu Leu Pro Arg Leu Val Tyr Val		

100	105	110
Ser Arg Glu Lys Arg Pro Gly Tyr Gln His His Lys Lys Ala Gly Ala 115 120 125		
Glu Asn Ala Leu Val Arg Val Ser Ala Val Leu Thr Asn Ala Pro Phe 130 135 140		
Ile Leu Asn Leu Asp Cys Asp His Tyr Ile Asn Asn Ser Lys Ala Met 145 150 155 160		
Arg Glu Ala Met Cys Phe Leu Met Asp Pro Gln Phe Gly Lys Lys Leu 165 170 175		
Cys Tyr Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg His Asp 180 185 190		
Arg Tyr Ala Asn Arg Asn Val Val Phe Phe Asp Ile Asn Met Leu Gly 195 200 205		
Leu Asp Gly Leu Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Val Phe 210 215 220		
Asn Arg Gln Ala Leu Tyr Gly Tyr Asp Pro Pro Val Ser Glu Lys Arg 225 230 235 240		
Pro Lys Met Thr Cys Asp Cys Trp Pro Ser Trp Cys Cys Cys Cys Cys 245 250 255		
Gly Gly Ser Arg Lys Lys Ser Lys Lys Lys Gly Glu Lys Lys Gly Leu 260 265 270		
Leu Gly Gly Leu Leu Tyr Gly Lys Lys Lys Lys Met Met Gly Lys Asn 275 280 285		
Tyr Val Lys Lys Gly Ser Ala Pro Val Phe Asp Leu Glu Glu Ile Glu 290 295 300		
Glu Gly Leu Glu Gly Tyr Glu Glu Leu Glu Lys Ser Thr Leu Met Ser 305 310 315 320		
Gln Lys Asn Phe Glu Lys Arg Phe Gly Gln Ser Pro Val Phe Ile Ala 325 330 335		
Ser Thr Leu Met Glu Asn Gly Gly Leu Pro Glu Gly Thr Asn Ser Thr 340 345 350		
Ser Leu Ile Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Glu 355 360 365		
Lys Thr Glu Trp Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr 370 375 380		
Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys Arg Gly Trp Lys Ser 385 390 395 400		
Val Tyr Cys Val Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile 405 410 415		
Asn Leu Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser		

420	425	430
Val Glu Ile Phe Leu Ser Arg His Cys Pro Leu Trp Tyr Gly Tyr Gly 435 440 445		
Gly Lys Leu Lys Trp Leu Glu Arg Leu Ala Tyr Ile Asn Thr Ile Val 450 455 460		
Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Ile Pro Ala 465 470 475 480		
Val Cys Leu Leu Thr Gly Lys Phe Ile Ile Pro Thr Leu Ser Asn Leu 485 490 495		
Thr Ser Val Trp Phe Leu Ala Leu Phe Leu Ser Ile Ile Ala Thr Gly 500 505 510		
Val Leu Glu Leu Arg Trp Ser Gly Val Ser Ile Gln Asp Trp Trp Arg 515 520 525		
Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala 530 535 540		
Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asp Thr Asn Phe 545 550 555 560		
Thr Val Thr Ala Lys Ala Ala Asp Asp Thr Glu Phe Gly Glu Leu Tyr 565 570 575		
Leu Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Ile Ile 580 585 590		
Leu Asn Met Val Gly Val Val Ala Gly Val Ser Asp Ala Ile Asn Asn 595 600 605		
Gly Tyr Gly Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe 610 615 620		
Trp Val Ile Leu His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg 625 630 635 640		
Gln Asn Arg Thr Pro Thr Ile Val Val Leu Trp Ser Ile Leu Leu Ala 645 650 655		
Ser Ile Phe Ser Leu Val Trp Val Arg Ile Asp Pro Phe Leu Pro Lys 660 665 670		
Gln Thr Gly Pro Val Leu Lys Gln Cys Gly Val Glu Cys 675 680 685		
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Leu Pro Gly Ile Asp Leu Phe Val Ser Thr Ala Asp Pro Glu Lys Glu
355 360 365

Pro Pro Leu Val Thr Ala Asn Thr Ile Leu Ser Ile Leu Ala Val Asp
370 375 380

Tyr Pro Val Glu Lys Val Ser Cys Tyr Leu Ser Asp Asp Gly Gly Ala
385 390 395 400

Leu Leu Ser Phe Glu Ala Met Ala Glu Ala Ala Ser Phe Ala Asp Leu
405 410 415

Trp Val Pro Phe Cys Arg Lys His Asn Ile Glu Pro Arg Asn Pro Asp
420 425 430

Ser Tyr Phe Ser Leu Lys Ile Asp Pro Thr Lys Asn Lys Ser Arg Ile
435 440 445

Asp Phe Val Lys Asp Arg Arg Lys Ile Lys Arg Glu Tyr Asp Glu Phe
450 455 460

Lys Val Arg Ile Asn Gly Leu Pro Asp Ser Ile Arg Arg Arg Ser Asp
465 470 475 480

Ala Phe Asn Ala Arg Glu Glu Met Lys Ala Leu Lys Gln Met Arg Glu
485 490 495

Ser Gly Gly Asp Pro Thr Glu Pro Val Lys Val Pro Lys Ala Thr Trp
500 505 510

Met Ala Asp Gly Thr His Trp Pro Gly Thr Trp Ala Ala Ser Thr Arg
515 520 525

Glu His Ser Lys Gly Asp His Ala Gly Ile Leu Gln Val Met Leu Lys
530 535 540

Pro Pro Ser Ser Asp Pro Leu Ile Gly Asn Ser Asp Asp Lys Val Ile
545 550 555 560

Asp Phe Ser Asp Thr Asp Thr Arg Leu Pro Met Phe Val Tyr Val Ser
565 570 575

Arg Glu Lys Arg Pro Gly Tyr Asp His Asn Lys Lys Ala Gly Ala Met
580 585 590

Asn Ala Leu Val Arg Ala Ser Ala Ile Leu Ser Asn Gly Pro Phe Ile
595 600 605

Leu Asn Leu Asp Cys Asp His Tyr Ile Tyr Asn Cys Lys Ala Val Arg
610 615 620

Glu Gly Met Cys Phe Met Met Asp Arg Gly Gly Glu Asp Ile Cys Tyr
625 630 635 640

Ile Gln Phe Pro Gln Arg Phe Glu Gly Ile Asp Pro Ser Asp Arg Tyr
645 650 655

Ala Asn Asn Asn Thr Val Phe Phe Asp Gly Asn Met Arg Ala Leu Asp

660										665					670				
Gly	Val	Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Thr	Met	Phe	Arg	Arg				
		675					680					685							
Phe	Ala	Leu	Tyr	Gly	Phe	Asp	Pro	Pro	Asn	Pro	Asp	Lys	Leu	Leu	Glu				
	690					695					700								
Lys	Lys	Glu	Ser	Glu	Thr	Glu	Ala	Leu	Thr	Thr	Ser	Asp	Phe	Asp	Pro				
705					710					715					720				
Asp	Leu	Asp	Val	Thr	Gln	Leu	Pro	Lys	Arg	Phe	Gly	Asn	Ser	Thr	Leu				
				725					730					735					
Leu	Ala	Glu	Ser	Ile	Pro	Ile	Ala	Glu	Phe	Gln	Gly	Arg	Pro	Leu	Ala				
		740						745					750						
Asp	His	Pro	Ala	Val	Lys	Tyr	Gly	Arg	Pro	Pro	Gly	Ala	Leu	Arg	Val				
		755					760					765							
Pro	Arg	Asp	Pro	Leu	Asp	Ala	Thr	Thr	Val	Ala	Glu	Ser	Val	Ser	Val				
	770					775					780								
Ile	Ser	Cys	Trp	Tyr	Glu	Asp	Lys	Thr	Glu	Trp	Gly	Asp	Arg	Val	Gly				
785					790					795					800				
Trp	Ile	Tyr	Gly	Ser	Val	Thr	Glu	Asp	Val	Val	Thr	Gly	Tyr	Arg	Met				
				805					810					815					
His	Asn	Arg	Gly	Trp	Arg	Ser	Val	Tyr	Cys	Ile	Thr	Lys	Arg	Asp	Ser				
			820					825					830						
Phe	Arg	Gly	Ser	Ala	Pro	Ile	Asn	Leu	Thr	Asp	Arg	Leu	His	Gln	Val				
		835					840					845							
Leu	Arg	Trp	Ala	Thr	Gly	Ser	Val	Glu	Ile	Phe	Phe	Ser	Arg	Asn	Asn				
	850					855					860								
Ala	Ile	Leu	Ala	Ser	Lys	Arg	Leu	Lys	Phe	Leu	Gln	Arg	Leu	Ala	Tyr				
865					870					875					880				
Leu	Asn	Val	Gly	Ile	Tyr	Pro	Phe	Thr	Ser	Leu	Phe	Leu	Ile	Leu	Tyr				
				885					890					895					
Cys	Phe	Leu	Pro	Ala	Phe	Ser	Leu	Phe	Ser	Gly	Gln	Phe	Ile	Val	Arg				
			900					905					910						
Thr	Leu	Ser	Ile	Ser	Phe	Leu	Val	Tyr	Leu	Leu	Met	Ile	Thr	Ile	Cys				
		915					920					925							
Leu	Ile	Gly	Leu	Ala	Val	Leu	Glu	Val	Lys	Trp	Ser	Gly	Ile	Gly	Leu				
	930					935					940								
Glu	Glu	Trp	Trp	Arg	Asn	Glu	Gln	Trp	Trp	Leu	Ile	Ser	Gly	Thr	Ser				
945					950					955					960				
Ser	His	Leu	Tyr	Ala	Val	Val	Gln	Gly	Val	Leu	Lys	Val	Ile	Ala	Gly				
				965					970					975					
Ile	Glu	Ile	Ser	Phe	Thr	Leu	Thr	Thr	Lys	Ser	Gly	Gly	Asp	Asp	Asn				

980

985

990

Glu Asp Ile Tyr Ala Asp Leu Tyr Ile Val Lys Trp Ser Ser Leu Met
 995 1000 1005

Ile Pro Pro Ile Val Ile Ala Met Val Asn Ile Ile Ala Ile Val Val
 1010 1015 1020

Ala Phe Ile Arg Thr Ile Tyr Gln Ala Val Pro Gln Trp Ser Lys Leu
 1025 1030 1035 1040

Ile Gly Gly Ala Phe Phe Ser Phe Trp Val Leu Ala His Leu Tyr Pro
 1045 1050 1055

Phe Ala Lys Gly Leu Met Gly Arg Arg Gly Lys Thr Pro Thr Ile Val
 1060 1065 1070

Phe Val Trp Ala Gly Leu Ile Ala Ile Thr Ile Ser Leu Leu Trp Thr
 1075 1080 1085

Ala Ile Asn Pro Asn Thr Gly Pro Ala Ala Ala Glu Gly Val Gly
 1090 1095 1100

Gly Gly Gly Phe Gln Phe Pro
 1105 1110

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<211> 1026

<212> PRT

<213> Arabidopsis thaliana

<400> 27

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Leu Val Val Ile His Asn His Glu Glu Pro Lys Pro Leu Lys Asn Leu
 20 25 30

Asp Gly Gln Phe Cys Glu Ile Cys Gly Asp Gln Ile Gly Leu Thr Val
 35 40 45

Glu Gly Asp Leu Phe Val Ala Cys Asn Glu Cys Gly Phe Pro Ala Cys
 50 55 60

Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Thr Gln Asn Cys Pro
 65 70 75 80

Gln Cys Lys Thr Arg Tyr Lys Arg Leu Arg Gly Ser Pro Arg Val Glu
 85 90 95

Gly Asp Glu Asp Glu Glu Asp Ile Asp Asp Ile Glu Tyr Glu Phe Asn
 100 105 110

Ile Glu His Glu Gln Asp Lys His Lys His Ser Ala Glu Ala Met Leu
 115 120 125

Tyr Gly Lys Met Ser Tyr Gly Arg Gly Pro Glu Asp Asp Glu Asn Gly
 130 135 140

Arg Phe Pro Pro Val Ile Ala Gly Gly His Ser Gly Glu Phe Pro Val

145	150	155	160
Gly Gly Gly Tyr	Gly Asn Gly Glu His	Gly Leu His Lys Arg Val	His
	165	170	175
Pro Tyr Pro Ser Ser	Glu Ala Gly Ser Glu Gly Gly Trp	Arg Glu Arg	
	180	185	190
Met Asp Asp Trp Lys Leu Gln	His Gly Asn Leu Gly	Pro Glu Pro Asp	
	195	200	205
Asp Asp Pro Glu Met Gly Leu Ile	Asp Glu Ala Arg Gln Pro Leu Ser		
	210	215	220
Arg Lys Val Pro Ile Ala Ser Ser Lys Ile	Asn Pro Tyr Arg Met Val		
	225	230	235
Ile Val Ala Arg Leu Val Ile Leu Ala Val	Phe Leu Arg Tyr Arg Leu		
	245	250	255
Leu Asn Pro Val His Asp Ala Leu Gly	Leu Trp Leu Thr Ser Val Ile		
	260	265	270
Cys Glu Ile Trp Phe Ala Val Ser Trp Ile Leu Asp	Gln Phe Pro Lys		
	275	280	285
Trp Phe Pro Ile Glu Arg Glu Thr Tyr Leu Asp	Arg Leu Ser Leu Arg		
	290	295	300
Tyr Glu Arg Glu Gly Glu Pro Asn Met Leu Ala	Pro Val Asp Val Phe		
	305	310	315
Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Val Thr	Ser Asn		
	325	330	335
Thr Val Leu Ser Ile Leu Ala Met Asp Tyr Pro Val Glu Lys Ile Ser			
	340	345	350
Cys Tyr Val Ser Asp Asp Gly Ala Ser Met Leu Thr Phe Glu Ser Leu			
	355	360	365
Ser Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe Cys Lys Lys			
	370	375	380
Phe Ser Ile Glu Pro Arg Ala Pro Glu Met Tyr Phe Thr Leu Lys Val			
	385	390	395
Asp Tyr Leu Gln Asp Lys Val His Pro Thr Phe Val Lys Glu Arg Arg			
	405	410	415
Ala Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Gln			
	420	425	430
Val Ala Lys Ala Ser Lys Val Pro Leu Glu Gly Trp Ile Met Gln Asp			
	435	440	445
Gly Thr Pro Trp Pro Gly Asn Asn Thr Lys Asp His Pro Gly Met Ile			
	450	455	460
Gln Val Phe Leu Gly His Ser Gly Gly Phe Asp Val Glu Gly His Glu			

465			470			475			480						
Leu	Pro	Arg	Leu	Val 485	Tyr	Val	Ser	Arg	Glu 490	Lys	Arg	Pro	Gly	Phe 495	Gln
His	His	Lys	Lys 500	Ala	Gly	Ala	Met	Asn 505	Ala	Leu	Val	Arg	Val 510	Ala	Gly
Val	Leu	Thr 515	Asn	Ala	Pro	Phe	Met 520	Leu	Asn	Leu	Asp	Cys 525	Asp	His	Tyr
Val	Asn 530	Asn	Ser	Lys	Ala	Val 535	Arg	Glu	Ala	Met	Cys 540	Phe	Leu	Met	Asp
Pro 545	Gln	Ile	Gly	Lys	Lys 550	Val	Cys	Tyr	Val	Gln 555	Phe	Pro	Gln	Arg	Phe 560
Asp	Gly	Ile	Asp	Thr 565	Asn	Asp	Arg	Tyr	Ala 570	Asn	Arg	Asn	Thr	Val 575	Phe
Phe	Asp	Ile	Asn 580	Met	Lys	Gly	Leu	Asp 585	Gly	Ile	Gln	Gly	Pro 590	Val	Tyr
Val	Gly	Thr 595	Gly	Cys	Val	Phe	Lys 600	Arg	Gln	Ala	Leu	Tyr 605	Gly	Tyr	Glu
Pro	Pro 610	Lys	Gly	Pro	Lys	Arg 615	Pro	Lys	Met	Ile	Ser 620	Cys	Gly	Cys	Cys
Pro 625	Cys	Phe	Gly	Arg	Arg 630	Arg	Lys	Asn	Lys	Lys 635	Phe	Ser	Lys	Asn	Asp 640
Met	Asn	Gly	Asp	Val 645	Ala	Ala	Leu	Gly	Gly 650	Ala	Glu	Gly	Asp	Lys 655	Glu
His	Leu	Met	Phe 660	Glu	Met	Asn	Phe	Glu 665	Lys	Thr	Phe	Gly	Gln 670	Ser	Ser
Ile	Phe	Val 675	Thr	Ser	Thr	Leu	Met 680	Glu	Glu	Gly	Gly	Val 685	Pro	Pro	Ser
Ser	Ser 690	Pro	Ala	Val	Leu	Leu 695	Lys	Glu	Ala	Ile	His 700	Val	Ile	Ser	Cys
Gly 705	Tyr	Glu	Asp	Lys	Thr 710	Glu	Trp	Gly	Thr	Glu 715	Leu	Gly	Trp	Ile	Tyr 720
Gly	Ser	Ile	Thr	Glu 725	Asp	Ile	Leu	Thr	Gly 730	Phe	Lys	Met	His	Cys 735	Arg
Gly	Trp	Arg	Ser 740	Ile	Tyr	Cys	Met	Pro 745	Lys	Arg	Pro	Ala	Phe 750	Lys	Gly
Ser	Ala	Pro 755	Ile	Asn	Leu	Ser	Asp 760	Arg	Leu	Asn	Gln	Val 765	Leu	Arg	Trp
Ala	Leu	Gly	Ser	Val	Glu	Ile 775	Phe	Phe	Ser	Arg	His 780	Ser	Pro	Leu	Trp
Tyr	Gly	Tyr	Lys	Gly	Gly	Lys	Leu	Lys	Trp	Leu	Glu	Arg	Phe	Ala	Tyr

Glu Trp Tyr Phe Ala Gln Lys Ile Asp Tyr Leu Lys Asp Lys Val Gln
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 Thr Ser Phe Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu Glu
 65 70 75 80
 Phe Lys Val Arg Val Asn Gly Leu Val Ala Lys Ala Gln Lys Val Pro
 85 90 95
 Glu Glu Gly Trp Ile Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn
 100 105 110
 Thr Arg Asp His Pro Gly Met Ile Gln Val Phe Leu Gly Gln Ser Gly
 115 120 125
 Gly Leu Asp Ala Glu Gly Asn Glu Leu Pro Arg Leu Val Tyr Val Ser
 130 135 140
 Arg Glu Lys Arg Pro Gly Phe Gln His His Lys Lys Ala Gly Ala Met
 145 150 155 160
 Asn Ala Leu Val Arg Val Ser Ala Val Leu Thr Asn Gly Ala Phe Leu
 165 170 175
 Leu Asn Leu Asp Cys Asp His Tyr Ile Asn Asn Ser Lys Ala Leu Arg
 180 185 190
 Glu Ala Met Cys Phe Leu Met Asp Pro Asn Leu Gly Lys Gln Val Cys
 195 200 205
 Tyr Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg Asn Asp Arg
 210 215 220
 Tyr Ala Asn Arg Asn Thr Val Phe Phe Asp Ile Asn Leu Arg Gly Leu
 225 230 235 240
 Asp Gly Ile Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Val Phe Asn
 245 250 255
 Arg Thr Ala Leu Tyr Gly Tyr Glu Pro Pro Leu Lys Pro Lys His Arg
 260 265 270
 Lys Thr Gly Ile Leu Ser Ser Leu Cys Gly Gly Ser Arg Lys Lys Ser
 275 280 285
 Ser Lys Ser Ser Lys Lys Gly Ser Asp Lys Lys Lys Ser Gly Lys His
 290 295 300
 Val Asp Ser Thr Val Pro Val Phe Asn Leu Glu Asp Ile Glu Glu Gly
 305 310 315 320
 Val Glu Gly Ala Gly Phe Asp Asp Glu Lys Ser Leu Leu Met Ser Gln
 325 330 335
 Met Ser Leu Glu Lys Arg Phe Gly Gln Ser Ala Val Phe Val Ala Ser
 340 345 350
 Thr Leu Met Glu Asn Gly Gly Val Pro Gln Ser Ala Thr Pro Glu Thr

355	360	365
Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys 370 375 380		
Thr Asp Trp Gly Ser Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu 385 390 395 400		
Asp Ile Leu Thr Gly Phe Lys Met His Ala Arg Gly Trp Arg Ser Ile 405 410 415		
Tyr Cys Met Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn 420 425 430		
Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Val 435 440 445		
Glu Ile Leu Phe Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Ser Gly 450 455 460		
Arg Leu Lys Trp Leu Glu Arg Phe Ala Tyr Val Asn Thr Thr Ile Tyr 465 470 475 480		
Pro Val Thr Ala Ile Pro Leu Leu Met Tyr Cys Thr Leu Pro Ala Val 485 490 495		
Cys Leu Leu Thr Asn Lys Phe Ile Ile Pro Gln Ile Ser Asn Leu Ala 500 505 510		
Ser Ile Trp Phe Ile Ser Leu Phe Leu Ser Ile Phe Ala Thr Gly Ile 515 520 525		
Leu Lys Met Lys Trp Asn Gly Val Gly Ile Asp Gln Trp Trp Arg Asn 530 535 540		
Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala Val 545 550 555 560		
Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr 565 570 575		
Val Thr Ser Lys Ala Ser Asp Glu Asp Gly Asp Phe Ala Glu Leu Tyr 580 585 590		
Met Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Ile 595 600 605		
Ile Asn Leu Val Gly Val Val Ala Gly Ile Ser Tyr Val Ile Asn Ser 610 615 620		
Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe 625 630 635 640		
Trp Val Ile Ile His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg 645 650 655		
Gln Asn Arg Thr Pro Thr Ile Val Val Val Trp Ser Ile Leu Leu Ala 660 665 670		
Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp Pro Phe Thr Thr Arg		

675	680	685
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690	695	700
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Gly Gln Thr Cys Gln Ile Cys Arg Asp Glu Ile Glu Leu Thr Val Asp		
	35	40 45
Gly Glu Pro Phe Val Ala Cys Asn Glu Cys Ala Phe Pro Val Cys Arg		
	50	55 60
Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Asn Gln Ala Cys Pro Gln		
	65	70 75 80
Cys Lys Thr Arg Phe Lys Arg Leu Lys Gly Ser Pro Arg Val Glu Gly		
	85	90 95
Asp Glu Glu Glu Asp Asp Ile Asp Asp Leu Asp Asn Glu Phe Glu Tyr		
	100	105 110
Gly Asn Asn Gly Ile Gly Phe Asp Gln Val Ser Glu Gly Met Ser Ile		
	115	120 125
Ser Arg Arg Asn Ser Gly Phe Pro Gln Ser Asp Leu Asp Ser Ala Pro		
	130	135 140
Pro Gly Ser Gln Ile Pro Leu Leu Thr Tyr Gly Asp Glu Asp Val Glu		
	145	150 155 160
Ile Ser Ser Asp Arg His Ala Leu Ile Val Pro Pro Ser Leu Gly Gly		
	165	170 175
His Gly Asn Arg Val His Pro Val Ser Leu Ser Asp Pro Thr Val Ala		
	180	185 190
Ala His Arg Arg Leu Met Val Pro Gln Lys Asp Leu Ala Val Tyr Gly		
	195	200 205
Tyr Gly Ser Val Ala Trp Lys Asp Arg Met Glu Glu Trp Lys Arg Lys		
	210	215 220
Gln Asn Glu Lys Leu Gln Val Val Arg His Glu Gly Asp Pro Asp Phe		
	225	230 235 240
Glu Asp Gly Asp Asp Ala Asp Phe Pro Met Met Asp Glu Gly Arg Gln		
	245	250 255
Pro Leu Ser Met Lys Ile Pro Ile Lys Ser Ser Lys Ile Asn Pro Tyr		

260	265	270
Arg Met Leu Ile Val Leu Arg 275	Leu Val Ile Leu Gly 280	Leu Phe Phe His 285
Tyr Arg Ile Leu His Pro 290	Val Lys Asp Ala Tyr 295	Ala Leu Trp Leu Ile 300
Ser Val Ile Cys Glu Ile Trp 305	Phe Ala Val Ser Trp 310	Val Leu Asp Gln 315 320
Phe Pro Lys Trp Tyr Pro 325	Ile Glu Arg Glu Thr 330	Tyr Leu Asp Arg Leu 335
Ser Leu Arg Tyr Glu Lys 340	Glu Gly Lys Pro Ser 345	Gly Leu Ser Pro Val 350
Asp Val Phe Val Ser Thr 355	Val Asp Pro Leu Lys 360	Glu Pro Pro Leu Ile 365
Thr Ala Asn Thr Val Leu 370	Ser Ile Leu Ala Val 375	Asp Tyr Pro Val Asp 380
Lys Val Ala Cys Tyr Val 385	Ser Asp Asp Gly Ala 390	Ala Ala Met Leu Thr Phe 395 400
Glu Ala Leu Ser Glu Thr 405	Ala Glu Phe Ala Arg 410	Lys Trp Val Pro Phe 415
Cys Lys Lys Tyr Cys Ile 420	Glu Pro Arg Ala Pro 425	Glu Trp Tyr Phe Cys 430
His Lys Met Asp Tyr Leu 435	Lys Asn Lys Val His 440	Pro Ala Phe Val Arg 445
Glu Arg Arg Ala Met Lys 450	Arg Asp Tyr Glu Glu 455	Phe Lys Val Lys Ile 460
Asn Ala Leu Val Ala Thr 465	Ala Gln Lys Val Pro 470	Glu Asp Gly Trp Thr 475 480
Met Gln Asp Gly Thr Pro 485	Trp Pro Gly Asn Ser 490	Val Arg Asp His Pro 495
Gly Met Ile Gln Val Phe 500	Leu Gly Ser Asp Gly 505	Val Arg Asp Val Glu 510
Asn Asn Glu Leu Pro Arg 515	Leu Val Tyr Val Ser 520	Arg Glu Lys Arg Pro 525
Gly Phe Asp His His Lys 530	Lys Ala Gly Ala Met 535	Asn Ser Leu Ile Arg 540
Val Ser Gly Val Leu Ser 545	Asn Ala Pro Tyr Leu 550	Leu Asn Val Asp Cys 555 560
Asp His Tyr Ile Asn Asn 565	Ser Lys Ala Leu Arg 570	Glu Ala Met Cys Phe 575
Met Met Asp Pro Gln Ser 580	Gly Lys Lys Ile Cys 585	Tyr Val Gln Phe Pro 590

580

585

590

Gln Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr Ser Asn Arg Asn
595 600 605

Val Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Leu Gln Gly
610 615 620

Pro Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr
625 630 635 640

Gly Phe Asp Ala Pro Lys Lys Lys Lys Gly Pro Arg Lys Thr Cys Asn
645 650 655

Cys Trp Pro Lys Trp Cys Leu Leu Cys Phe Gly Ser Arg Lys Asn Arg
660 665 670

Lys Ala Lys Thr Val Ala Ala Asp Lys Lys Lys Lys Asn Arg Glu Ala
675 680 685

Ser Lys Gln Ile His Ala Leu Glu Asn Ile Glu Glu Gly Arg Gly His
690 695 700

Lys Val Leu Asn Val Glu Gln Ser Thr Glu Ala Met Gln Met Lys Leu
705 710 715 720

Gln Lys Lys Tyr Gly Gln Ser Pro Val Phe Val Ala Ser Ala Arg Leu
725 730 735

Glu Asn Gly Gly Met Ala Arg Asn Ala Ser Pro Ala Cys Leu Leu Lys
740 745 750

Glu Ala Ile Gln Val Ile Ser Arg Gly Tyr Glu Asp Lys Thr Glu Trp
755 760 765

Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu
770 775 780

Thr Gly Ser Lys Met His Ser His Gly Trp Arg His Val Tyr Cys Thr
785 790 795 800

Pro Lys Leu Ala Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp
805 810 815

Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu Ile Phe
820 825 830

Leu Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly Leu Lys
835 840 845

Trp Leu Glu Arg Leu Ser Tyr Ile Asn Ser Val Val Tyr Pro Trp Thr
850 855 860

Ser Leu Pro Leu Ile Val Tyr Cys Ser Leu Pro Ala Ile Cys Leu Leu
865 870 875 880

Thr Gly Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Ser Ile Leu
885 890 895

Phe Met Ala Leu Phe Ser Ser Ile Ala Ile Thr Gly Ile Leu Glu Met

900 905 910
 Gln Trp Gly Lys Val Gly Ile Asp Asp Trp Trp Arg Asn Glu Gln Phe
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 Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala Leu Phe Gln Gly
 930 935 940
 Leu Leu Lys Val Leu Ala Gly Val Asp Thr Asn Phe Thr Val Thr Ser
 945 950 955 960
 Lys Ala Ala Asp Asp Gly Glu Phe Ser Asp Leu Tyr Leu Phe Lys Trp
 965 970 975
 Thr Ser Leu Leu Ile Pro Pro Met Thr Leu Leu Ile Ile Asn Val Ile
 980 985 990
 Gly Val Ile Val Gly Val Ser Asp Ala Ile Ser Asn Gly Tyr Asp Ser
 995 1000 1005
 Trp Gly Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val Ile Ile
 1010 1015 1020
 His Leu Tyr Pro Phe Leu Lys Gly Leu Leu Gly Lys Gln Asp Arg Met
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 Pro Thr Ile Ile Val Val Trp Ser Ile Leu Leu Ala Ser Ile Leu Thr
 1045 1050 1055
 Leu Leu Trp Val Arg Val Asn Pro Phe Val Ala Lys Gly Gly Pro Ile
 1060 1065 1070
 Leu Glu Ile Cys Gly Leu Asp Cys Leu
 1075 1080